UE 4100 for
C 4000 Standard/Advanced
Function Package

SICK

QUALITY SYSTEM

certified by DQS according to
DIN EN ISO 9001   Reg. No. 462-03

List of contents

1 About this document

Please read this chapter carefully before working with this documentation and the Function Package UE 4100 for C 4000 Standard/Advanced.

Note   The Function Package UE 4100 for C 4000 Standard/Advanced enables additional functions of the Safety Light Curtain C 4000 to be used in conjunction with the Bus Node UE 4155.

1.1 Function of this document

These operating instructions are designed to address the *technical personnel of the machine manufacturer* or the *machine operator* in regards to safe mounting, configuration, electrical installation, commissioning, operation and maintenance of the bus node with activated Function Package UE 4100 for C 4000 Standard/Advanced in connection with the Safety Light Curtain C 4000.

These operating instructions do *not* provide instructions for operating machines on which the bus node resp. the safety light curtain is, or will be, integrated. Information on this is to be found in the appropriate operating instructions of the machine.

1.2 Target group

These operating instructions are addressed to *planning engineers*, *developers* and the *operators* of plant and systems which are to be protected by one or several Safety Light Curtains C 4000 in connection with the Bus Node UE 4155. It also addresses people who integrate the Bus Node UE 4155 into a machine/system, initialise its use, or who are in charge of servicing and maintaining the device.

1.3 Depth of information

These operating instructions only describe the functions of the Safety Light Curtain C 4000 that can be realised in conjunction with the Bus Node UE 4155. All other functions of the safety light curtain are described in the "C 4000 Safety Light Curtain" operating instructions (SICK-Part No. 8 009 861). All other functions of the Bus Node UE 4100 are described in the "UE 4100 PROFIsafe Bus Node" operating instructions (SICK-Part No. 8 010 178).

These operating instructions contain the following information on the Bus Node UE 4155 with Function Package UE 4100 for C 4000 Standard/Advanced and in conjunction with the Safety Light Curtain C 4000:

- installation and mounting
- electrical installation
- putting into operation and configuration
- care and maintenance
- fault, error diagnosis and troubleshooting
- part numbers
- conformity and approval

Planning and using protective devices such as the C 4000 also require specific technical skills which are not detailed in this documentation.

When operating the bus node in connection with the Safety Light Curtain C 4000, the national, local and statutory rules and regulations must be observed.

General information on accident prevention using opto-electronic protective devices can be found in the brochure "Safe Machines with opto-electronic protective devices".

Note   We also refer you to the SICK homepage on the Internet at

www.sick.com

Here you will find information on:

- sample applications

- a list of Frequently Asked Questions on using the C 4000 in connection with the Bus Node UE 4100

- these operating instructions in different languages for viewing and printing

- certificates on the prototype test, the EC declaration of conformity and other documents

1.4   Abbreviations

ESPE	Electro-sensitive protective equipment (e.g. C 4000)
CDS	SICK Configuration & Diagnostic Software = software for the configuration of the Bus Node UE 4100
BDC	Bottom dead centre. Indicates to a press that the bottom dead centre has been reached
EDM	External device monitoring
EFI	Enhanced function interface = safe SICK device communication
FPLC	Fail-safe programmable logic controller
MCC	Machine cycle contact. Indicates to a press that a certain point in the machine cycle has been reached
OSSD	Output signal switching device
PSDI	Presence sensing device initiation = PSDI mode
SCC	Stop control contact = Run-on monitoring. Indicates to a press the end of the expected stopping path
SDL	Safety data link = SICK safety interface (connection for OSSDs and EFI)
TDC	Top dead centre. Indicates to a press that the top dead centre has been reached
UE 4100	All bus nodes of the UE 4100 family. These are Bus Nodes UE 4120, UE 4150 and UE 4155 in these operating instructions.

1.5   Symbols used

Recommendation   Recommendations are designed to give you some assistance in your decision-making process with respect to a certain function or a technical measure.

Note   Refer to notes for special features of the device.
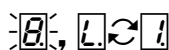
🔢, 🔄   Display indicators show the status of the 7-segment display of sender or receiver:

U	Constant indication of characters, e.g. U
8	Flashing indication of characters, e.g. 8
L⟳1	Alternating indication of characters, e.g. L and 1

The depiction of numbers on the 7-segment display of the C 4000 can be rotated by 180° with the aid of the CDS. In this document the depiction of the 7-segment display is however always in the normal, non-rotated position. Please consult the C 4000 operating instructions for a detailed description of the C 4000 indicators.

● **Yellow**, ☀ **Yellow**, ○ **Yellow**   LED symbols describe the state of a diagnostics LED. Examples:

● **Yellow**	The yellow LED is illuminated constantly.
☀ **Yellow**	The yellow LED is flashing.
○ **Yellow**	The yellow LED is off.

➢ Take action …

Instructions for taking action are shown by an arrow. Carefully read and follow the instructions for action.

WARNING

Warning!

A warning indicates an actual or potential risk or health hazard. They are designed to help you to prevent accidents.

Carefully read and follow the warnings!

Software notes show the location in the CDS (Configuration & Diagnostic Software) where you can make the appropriate settings and adjustments. In the CDS open the menu **View**, **Dialog box** and select the item **File Cards** to go straight to the above dialog fields. Alternatively, the software wizard will guide you through the appropriate setting.

The software notes contained in the operating instructions of the Safety Light Curtain C 4000 also apply in connection with the bus node. Depending on the scope of the respective function (see page 20 of this document) you will find the corresponding setting in the CDS *below* the selections **System** or **Operating mode** of the configuration dialog.
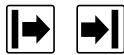
Sender and receiver

In drawings and diagrams, the symbol denotes the C 4000 sender and the symbol denotes the C 4000 receiver.

The term "dangerous state"

The dangerous state (standard term) of the machine is always shown in the drawings and diagrams of this document as a movement of a machine part. In practical operation, there may be a number of different dangerous states:

- machine movements
- electrical conductors
- visible or invisible radiation
- a combination of several risks and hazards

2   On safety

This chapter deals with your own safety and the safety of the equipment operators.

➢ Please read this chapter carefully before starting to work with the UE 4100 or with machinery protected by the Safety Light Curtain C 4000 in connection with the UE 4100.

2.1   Specialist personnel

The Bus Node UE 4100 PROFISAFE with activated Function Package UE 4100 for C 4000 Standard/Advanced may only be assembled, operated and maintained by specialist personnel. Specialist personnel are defined as persons who

• have undergone the appropriate technical training

and

• who have been instructed by the responsible machine operator in the operation of the machine and the current valid safety guidelines

and

• who have access to the operating instructions of the Bus Node UE 4100 and of the Safety Light Curtain C 4000.

2.2   Applications of the device

The Function Package UE 4100 for C 4000 Standard/Advanced can only be used with the Bus Node UE 4155. It expands the possible applications for the bus node in conjunction with the Safety Light Curtain C 4000. The physical resolution, the maximum protective field width and the realizable protective field height of the C 4000 are not changed by deploying the function package.

On the usage of the C 4000 in conjunction with the Bus Node UE 4100, additional mechanical protective devices may be necessary depending on the functions realised in the application, e.g. on blanking or bypass.

2.3   Correct use

The Bus Node UE 4100 must be used only as defined in chapter 2.2 "Applications of the device". It must be used only by qualified personnel and only on the machine where it has been installed and initialised by qualified personnel in accordance with these operating instructions.

If the device is used for any other purposes or modified in any way — also during mounting and installation — any warranty claim against SICK AG shall become void.

2.4 General safety notes and protective measures

WARNING

Safety notes

Please observe the following procedures in order to ensure the correct and safe use of the Safety Light Curtain C 4000 in connection with the Bus Node UE 4100.

- Please observe the notes in the chapter titled "General safety notes and protective measures" of the C 4000 operating instructions.
- Moreover, it may be necessary to observe the following standards, among other things, for your particular application:
  – EN 692: Mechanical Presses, Safety
  – EN 693: Hydraulic Presses, Safety
- The operating instructions of the C 4000 and the UE 4100 as well as the operating instructions of the Function Package UE 4100 for C 4000 Standard/Advanced must be made available to the operator of the machine, with which the Safety Light Curtain C 4000 in connection with the UE 4100 is used. The machine operator is to be instructed in the use of the device by specialist personnel and must be instructed to read the operating instructions.

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3 Product description

This chapter contains information about the special properties of the Bus Node UE 4100 with Function Package UE 4100 for C 4000 Standard/Advanced It describes the construction and the operating principle of the device, in particular the different operating modes in connection with the Safety Light Curtain C 4000.

➢ Please read this chapter before mounting, installing and commissioning the device.

Note The functions of the bus node with activated Function Package UE 4100 for C 4000 Standard/Advanced can only be used in conjunction with a Safety Light Curtain C 4000 that has the following entry on the type label in the *Software version* field: "3.00" or higher.

3.1 Special features

The bus node with Function Package UE 4100 for C 4000 Standard/Advanced expands the possible applications of the Safety Light Curtain C 4000:

- 6 operating modes can be predefined (see page 19)
- PSDI mode (see page 12)
- protective field evaluation bypass (see page 11)
- teach-in mode: adjusts the blanked-out areas directly on the device using corresponding objects in the protective field (see page 18)

3.2 Operating principle of the device

The operating principle of the bus node is described in the operating instructions "UE 4100 PROFIsafe Bus Node". The Function Package UE 4100 for C 4000 Standard/Advanced is a software component which can be used in connection with the Bus Node UE 4155.

With the function package activated, the bus node can transfer data directly to the SDL connection and thus to the Safety Light Curtain C 4000; this data can include:

- process data from the FPLC, e.g. for the control of the PSDI mode
- input information from sensors that are connected to the field signal connections on the bus node, without needing to pass through the FPLC (so-called cross-routing), e.g. the machine cycle contacts for the top and bottom dead centres on a press

Conversely, the bus node can transfer input signals for the safe SICK device communication of the C 4000 directly to a field signal output on the bus node, e.g.

- the application diagnostic output (ADO)
- the display *Reset required*

3.3 Configurable functions

This chapter describes the functions of the Safety Light Curtain C 4000 which are selectable via software, which can be used *in connection with the Bus Node UE 4100 and the Function Package UE 4100 for C 4000 Standard/Advanced*. The functions can be partially combined with the other configurable functions of the safety light curtain.

⚠ **WARNING**

Test the protective device after any changes!

Each time the configuration is changed you must test the effectiveness of the entire protective device (see chapter titled "Test notes" in the operating instructions of the Safety Light Curtain C 4000).

3.3.1 Bypass

Fig. 1: Schematic layout of the bypass function
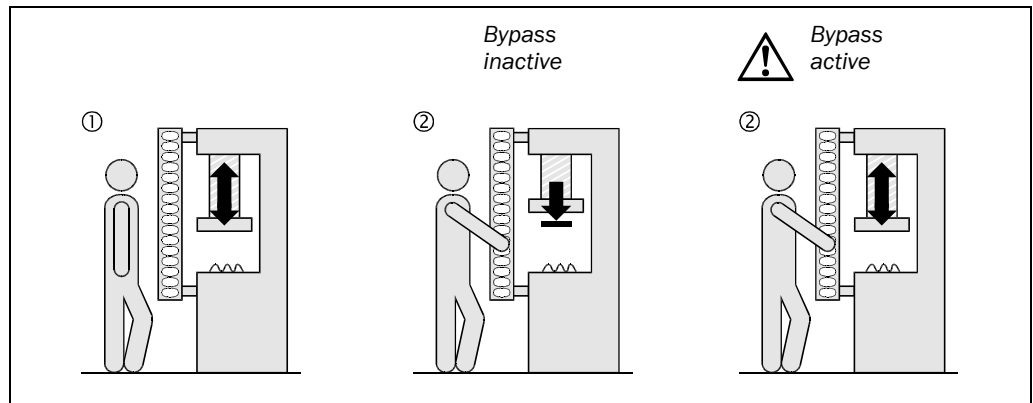
In some applications it is at times necessary to mute the protective field evaluation of the safety light curtain. This could be, e.g., in a safe machine setup mode, in which the machine can be operated only in jog mode. When the bypass is active, the safety light curtain displays ● **Green** and the 7-segment display of the receiver displays ⏚.

⚠ **WARNING**

Switch on the machine safely, when using the bypass function!

While the bypass function is active, the safety light curtain will **not** detect any intervention in the protective field. You must ensure that other protective measures are forcibly activated during the bypass, e.g. the safe machine setup mode, so that the machine cannot endanger persons or parts of the machine during the bypass function.

The bypass function may only be activated by a key-operated switch with an automatic reset and two levels or by two input signals that are independent of each other, e.g. two positioning switches.

Notes
- It must be possible to view the entire hazardous point when pressing the key-operated switch.
- If you activate the bypass function, you can connect a teach-in key-operated switch (see page 24) only directly to the C 4000.
- It is not possible to combine the bypass and PSDI-mode functions.

- The safety light curtain terminates the bypass function automatically, when …
  - the operator starts a teach-in procedure.
  - the operator changes the operating mode.
  - there is a signal change at the Emergency Stop input of the C 4000.
  - a system error (lock-out) occurs.
- 200 ms after switching off the bypass, the system is again in a safe status (latency time).

Device symbol **C 4000 Host (receiver)**, context menu **Configuration draft**, **Edit**, selection of the **Operating mode**, file card **General**, option **Bypass**.

The connection of the key-operated pushbutton for bypass is described in chapter 4.2 "Key-operated pushbutton for bypass" on page 23.

You can control the bypass function on the C 4000 in two ways:

- Using the process image from the FPLC. In this case the connection configuration of the key-operated pushbutton for bypass must be made in the FPLC or in a suitable decentral F peripheral. The representation of the bypass function in the process image is described in section 9.1.2 under "Output signal from the FPLC to the SDL connection" on page 34.

- Using cross-routing direct from the field signal input on the bus node to which the key-operated pushbutton for bypass is connected. For this purpose you must select in the CDS the appropriate application from the function package: Device symbol **UE 4100 PROFIsafe**, context menu **Configuration draft**, **Edit**, file card **I/O #**, option **Application** = "Key-operated pushbutton for bypass (C 4000)".

3.3.2 PSDI mode

Fig. 2: Schematic layout of the dual mode PSDI
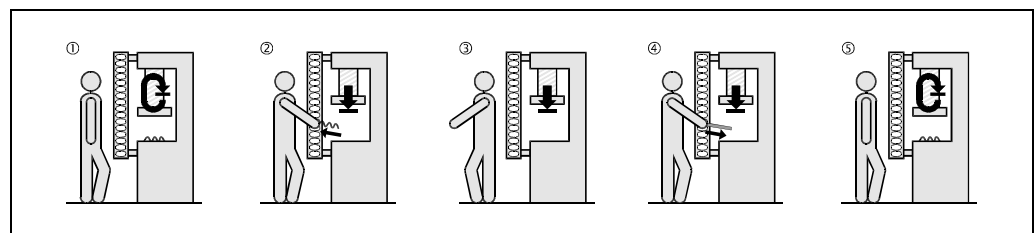
In the PSDI mode, the machine waits at the top dead centre for a defined number of interruptions by the operator. After a certain number of interruptions, the safety light curtain automatically releases the dangerous movement. Dual mode PSDI means e.g. that the safety light curtain causes the movement to be blocked following the initial interruption by the operator (②). The safety light curtain does not release the movement until the operator has completed the second interruption (④) (⑤).

Note The PSDI-mode function can only be configured for light curtains with an effective operating resolution of ≤ 30 mm.

Device symbol **C 4000 Host (receiver)**, context menu **Configuration draft**, **Edit**, selection of the **Operating mode**, file card **General**, area **PSDI mode**.

PSDI time monitoring

In the case of active PSDI time monitoring, the maximum duration of an entire PSDI is limited to 30 seconds.

- The 30 seconds start by the machine being stopped at the top dead centre.

- If the final PSDI interruption of an entire PSDI is not terminated within this time, the safety light curtain remains red and waits until the reset button has been operated.

PSDI time monitoring has been configured by default and can be deactivated.

Device symbol **C 4000 Host (receiver)**, context menu **Configuration draft**, **Edit**, selection of the **Operating mode**, file card **General**, option **PSDI time monitoring active**.

PSDI window

You can determine the section of the protective field in which the safety light curtain can interpret an interruption as a PSDI. This section of the protective field is called the *PSDI window*.

Fig. 3: Function of the PSDI window

If you configure a PSDI window as shown in Fig. 3, the safety light curtain only interprets ② as a valid PSDI interruption.

Notes
- You can only define one PSDI window. This also applies to a cascading system.

- At least one beam must be free between the PSDI window and adjacent blanked-out areas.

- If you do not define a PSDI window, all areas of the protective field that have not been blanked out are PSDI windows.
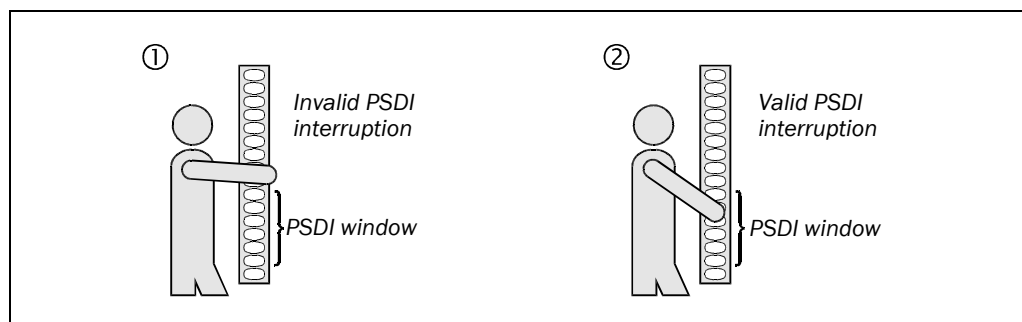
Device symbol **C 4000 Host (receiver)**, context menu **Configuration draft**, **Edit**, selection of the **Operating mode**, file card **General**, option **PSDI window**. You must then specify the beginning and the size of the PSDI window on file card **Host** or **Guest** of the system in question.

Significance of the machine cycle contact for PSDI mode operation

Fig. 4: Schematic layout of the machine cycle for PSDI mode operation for the example of a press
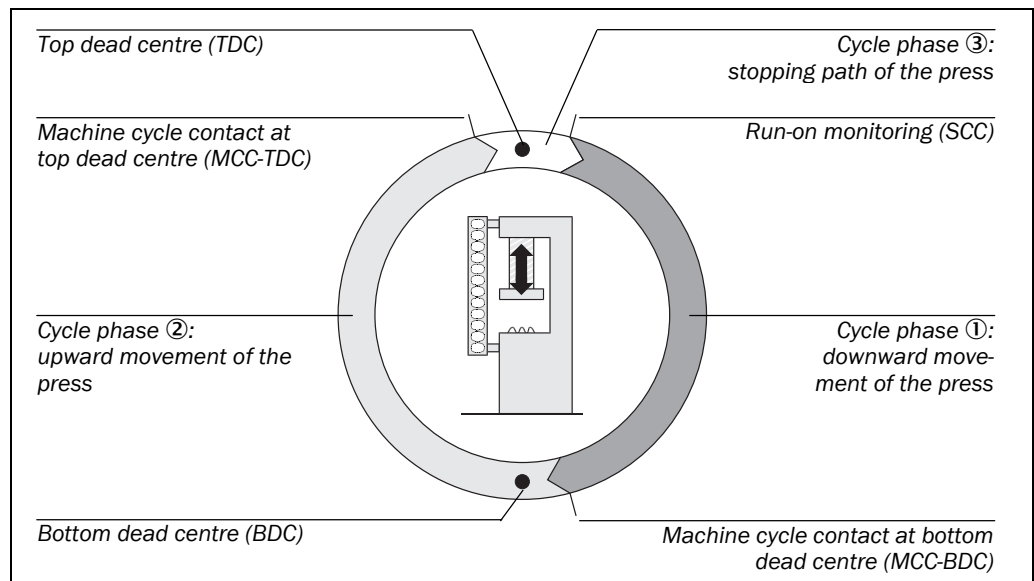
To ensure that the PSDI mode operation is safe and true to the application, the C 4000 in connection with the bus node evaluates three machine signals:

- run-on monitoring (SCC)
  Run-on monitoring evaluation is optional.

- bottom dead centre (MCC-BDC)

- top dead centre (MCC-TDC)

On the basis of the three machine signals, the safety light curtain can identify the machine's current cycle phase:

① Downward movement of the press. This cycle phase involves danger.

② Upward movement of the press. This cycle phase does not involve danger for all machines.

③ Stopping the press. This cycle phase does not involve danger provided the "run-on monitoring" machine signal is not followed.

The figure below clarifies the process in time with the aid of an example of the single mode PSDI:

Fig. 5: Time-process diagram for single mode PSDI
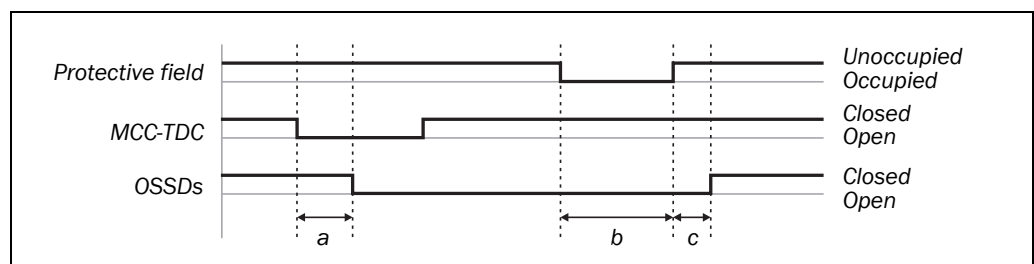
a Max. 150 ms after reaching the machine cycle contact MCC-TDC, the protective contacts (OSSDs) fall away.

b The operator reaches into the protective field for at least 100 ms. The protective device therefore recognizes the interruption as PSDI.

c The protective contacts close again no longer than 200 ms after the last PSDI.

Note The C 4000 does not offer control and monitoring functions for reverse operations or single-stroke safety. In other words, the safety light curtain cannot detect any reverse movement of the machine.

You can control the PSDI-mode function on the C 4000 in two ways:

- Using the process image from the FPLC. In this case the connection configuration of the machine cycle contact MCC-TDC must be made in the FPLC or in a suitable decentral F peripheral. The representation of the machine cycle contacts in the process image is described in section 9.1.2 "Output signal from the FPLC to the SDL connection" on page 34.

- Using cross-routing direct from the field signal input on the bus node to which the machine cycle contact MCC-TDC is connected. For this purpose you must select in the CDS the appropriate application from the function package: Device symbol **UE 4100 PROFIsafe**, context menu **Configuration draft**, **Edit**, file card **I/O #**, option **Application** = "MCC-TDC for PSDI and sampling (C 4000)".

The electrical connection of the machine cycle contacts to the bus node is described in chapter 4.4 "Machine cycle contacts" on page 25.

Product description

Start sequence (PSDI mode initiation)

The C 4000 supports three start sequences in PSDI mode in conjunction with the bus node:

Tab. 1: Possible start sequences in PSDI mode

		Standard	Alternative ("Sweden Mode")	Without restart interlock
Start sequence	**Requirements**	The machine cycle contact MCC-TDC must be connected.		
		The internal restart interlock of the C 4000 must be activated.		The internal restart interlock of the C 4000 is deactivated. An external restart interlock must be available.
	Procedure	You have just switched on the machine or have switched the machine to an operating mode with the PSDI mode.		
		The ● **Yellow** LED of the host system is illuminated constantly.	The ☀● **Yellow** LED of the host system is flashing.	The ● **Yellow** LED of the host system is illuminated constantly.
		➤ Reach once or twice into the protective field according to the PSDI mode. ➤ Press the reset button.	➤ Press the reset button. ➤ Reach once or twice into the protective field according to the PSDI mode.	➤ Reach once or twice into the protective field according to the PSDI mode.
		The machine runs until it reaches the top dead centre and waits there for the PSDI. The ● **Yellow** LED of the host receiver is then illuminated constantly.		
PSDI cycle	**Interruption during the downward movement (①)**	The safety light curtain changes to red.		
	Interruption during the upward movement (②)	The behavior of the safety light curtain depends on the PSDI control (see "Eccentric press mode" further below).		
	Interruption during the stopping phase (③)	First interruption: PSDI starts Last interruption: PSDI ends. The safety light curtain reverts to Green as soon as the protective field interruption is ended.		

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Releasing the PSDI control

You can release the PSDI control in two different ways:

- Limited: The safety light curtain only evaluates interruptions within the stopping phase as a PSDI, i.e. if the machine cycle contact was made for the top dead centre (MCC-TDC) and has also fallen away again.

- Not limited: The safety light curtain also evaluates interruptions within the upward and stopping phases as PSDIs if the machine cycle contact is made for the top dead centre (MCC-TDC) and has not yet fallen away again. This configuration makes higher clock speeds possible.

WARNING

Limit the release of the PSDI control if the machine does not automatically stop at the top dead centre!

➢ If you wish to set the release of the PSDI control to *Not limited*, then you must make sure at the machine side that the machine stops automatically at the top dead centre.

➢ For this you must always observe the standards that apply for your specific application/ machine situation.

Device symbol **C 4000 Host (receiver)**, context menu **Configuration draft**, **Edit**, selection of the **Operating mode**, file card **General**, option **Enable PSDI control**.

Run-on monitoring

The purpose of run-on monitoring is to detect any failure of the machine brake at the top dead centre. If you activate run-on monitoring, the C 4000 in front of the stroke release monitors whether the SCC is still closed, i.e. whether the machine has actually stopped at the top dead centre.

If the press exceeds the SCC before the operator has intervened once or twice depending on the PSDI mode, the C 4000 switches to lock-out.

Note   The SCC contact must be connected for run-on monitoring.

Device symbol **C 4000 Host (receiver)**, context menu **Configuration draft**, **Edit**, selection of the **Operating mode**, file card **General**, option **Run-on monitoring active**.

You can control the run-on monitoring function of the C 4000 in two ways:

- Using the process image from the FPLC. In this case the connection configuration of the machine cycle contact SCC must be made in the FPLC or in a suitable decentral F peripheral. The representation of the machine cycle contacts in the process image is described in section 9.1.2 "Output signal from the FPLC to the SDL connection" on page 34.

- Using cross-routing direct from the field signal input on the bus node to which the machine cycle contact SCC is connected. For this purpose you must select in the CDS the appropriate application from the function package: Device symbol **UE 4100 PROFIsafe**, context menu **Configuration draft**, **Edit**, file card **I/O #**, option **Application** = "SCC Run-on monitoring (C 4000)".

Eccentric press mode

Eccentric presses must not be allowed to stop at the bottom dead centre because their construction does not enable them to stop in this situation. In eccentric press mode, the safety light curtain mutes the protective field function in this phase. The muting begins when the machine cycle contact for the bottom dead centre is reached. You must ensure that the machine cycle contact for the bottom dead centre is not made until *after* the end of the dangerous movement. The muting ends when the machine cycle contact for top dead centre is reached, but no longer than after 30 seconds.

Note   When you configure the eccentric press mode you must also connect the machine cycle contact for the bottom dead centre (MCC-BDC). The connection to the bus node is described in chapter 4.4 "Machine cycle contacts" on page 25.

⚠
WARNING

Protect the machine during the mute state!

In eccentric press mode, you must take suitable measures to ensure that no dangerous state can occur while muting is active.

Device symbol **C 4000 Host (receiver)**, context menu **Configuration draft**, **Edit**, selection of the **Operating mode**, file card **General**, option **Eccentric press mode active**.

Note   In eccentric press mode with release mode "not limited", the safety light curtain only detects an interruption during the total muting time as PSDI, if the interruption lasts longer than the time it takes to reach the machine cycle contact for the top dead centre (MCC-TDC).

You can control the eccentric press mode function of the C 4000 in two ways:

• Using the process image from the FPLC. In this case the connection configuration of the machine cycle contact MCC-BDC must be made in the FPLC or in a suitable decentral F peripheral. The representation of the machine cycle contacts in the process image is described in section 9.1.2 "Output signal from the FPLC to the SDL connection" on page 34.

• Using cross-routing direct from the field signal input on the bus node to which the machine cycle contact MCC-BDC is connected. For this purpose you must select in the CDS the appropriate application from the function package: Device symbol **UE 4100 PROFIsafe**, context menu **Configuration draft**, **Edit**, file card **I/O #**, option **Application** = "MCC-BDC for eccentric press mode (C 4000)".

3.3.3   Teach-in

The configurable teach-in function has been realised in the Safety Light Curtain C 4000 and explained in the appropriate operating instructions.

You can control the teach-in function on the C 4000 in two ways:

• Using the process image from the FPLC. In this case the connection configuration of the teach-in key-operated switch must be made in the FPLC or in a suitable decentral F peripheral. The representation of the teach-in key operated switch in the process image is described in section 9.1.2 "Output signal from the FPLC to the SDL connection" on page 34.

• Using cross-routing direct from the field signal input on the bus node to which the teach-in key-operated switch is connected. For this purpose you must select in the CDS the appropriate application from the function package: Device symbol **UE 4100 PROFIsafe**, context menu **Configuration draft**, **Edit**, file card **I/O #**, option **Application** = "Teach-in key-operated switch (C 4000)".

The electrical connection of the teach-in key-operated switch to the bus node is described in chapter 4.3 "Teach-in key-operated switch" of this document on page 24.

3.4 Operating modes

You can configure up to six operating modes with the aid of the CDS. The operator can switch between these operating modes by means of an operating mode selector switch. This section describes the scope of the configured functions and the possibilities for combining them.

Notes
• The operating mode selector switch *must* be a key-operated switch.

• You can also set up fewer than six operating modes.

• No electrical connection may be made for operating modes that are not in use. Otherwise the safety light curtain will be completely blocked (lock-out).

WARNING

Check the protective device in every operating mode and after every change!

If you configure several operating modes, you must especially check the operation of the protective device in each of these operating modes. To this end, you must observe the test notes in the operating instructions of the Safety Light Curtain C 4000.

Device symbol **C 4000 Host (receiver)**, context menu **Configuration draft**, **Edit**, area **Operating modes**. You can find more information on setting up and storing an operating mode in the CDS online help for the C 4000.

The operating mode selector switch can control the C 4000 in two ways:

• Using the process image from the FPLC. In this case the connection configuration of the operating mode selector switch must be made in the FPLC or in a suitable decentral F peripheral. The representation of the operating mode selector switch in the process image is described in section 9.1.2 "Output signal from the FPLC to the SDL connection" on page 34.

• Using cross-routing direct from the field signal inputs on the bus node to which the contacts on the operating mode selector switch are connected. For this purpose you must select in the CDS the appropriate application from the function package for each field signal input affected: Device symbol **UE 4100 PROFIsafe**, context menu **Configuration draft**, **Edit**, file card **I/O #** option **Application** = "Operating mode selector switch 1 of # (C 4000)". Choose the operating mode selector switch to suit the number of operating modes actually configured in the C 4000, e.g. "1 of 4", if you have configured four operating modes.

The connection of the operating mode selector switch to the bus node is described in chapter 4.1 "Operating mode selector switch" on page 22.

3.4.1 Scope of configurable functions

The configurable functions of the C 4000 have different scopes (cf. Tab. 2). The scope depends on whether …

- the function can be configured separately for every individual system in a cascade or only for the entire cascade.
- the function can be configured separately for every operating mode or only for the entire application.

Depending on the scope of the function in question, you can find the corresponding setting in CDS under the **System** or **Operating mode** options of the CDS configuration dialog box.

Tab. 2: Scope of configurable functions

Configurable function	Scope			
	All the systems of a cascade	An individual system	All operating modes	One operating mode
Rotation of the 7-segment display		■	■	
PSDI mode	■			■
PSDI window		■		■
Beam coding	■		■	
External device monitoring (EDM)	■		■	
Reduced resolution		■		■
Scanning range		■	■	
Type of bypass switch	■		■	
Enable bypass	■			■
Emergency stop-input	■		■	
Fixed blanking		■		■
Floating blanking		■		■
Teach-in	■		■	
Type of restart interlock (internal/external)	■			■
Type of reset button	■		■	
Connection site of the reset button	■		■	
Application diagnostic output	■		■	

3.4.2 Functions that cannot be combined

Several functions of the Safety Light Curtain C 4000 cannot be combined.

Note You can configure two functions, each of which are applicable within one operating mode, in two different operating modes of the same application, even if Tab. 3 indicates that the two functions cannot be combined.

Tab. 3: Functions that cannot be combined

Configurable function	Limitation
Teach-in key-operated switch on the extension connection	• Not with an Emergency Stop on the C 4000
Teach-in key-operated switch on the bus node	• Not with *bypass*
Emergency stop	• Not with the teach-in key-operated switch on the extension connection of the C 4000
Bypass	• Not with *PSDI mode* • Not with *PSDI window* • Not with a teach-in key-operated switch on the bus node
PSDI mode	• Not with *bypass* • Not with *fixed blanking with increased size tolerance* • Not with *floating blanking with partial object monitoring* • Not with *reduced resolution*, if the *effective resolution* is > 30 mm
PSDI window	• Not with *bypass* • Not with *fixed blanking with increased size tolerance* • Not with *floating blanking* • Not with *reduced resolution*
Reduced resolution (effective resolution > 30 mm)	• Not with *fixed blanking with increased size tolerance* • Not with *floating blanking with partial object monitoring* • Not with *PSDI mode* • Not with *PSDI window*
Floating blanking with partial object monitoring	• Not with *fixed blanking with increased size tolerance* • Not with *reduced resolution* • Not with *PSDI mode* • Not with *PSDI window*
Fixed blanking with increased size tolerance	• Not with *floating blanking with partial object monitoring* • Not with *reduced resolution* • Not with *PSDI mode* • Not with *PSDI window*

4   Electrical installation

⚠️
WARNING

Switch the entire machine/system off line!

The machine/system could inadvertently start up while you are connecting the devices.

➢ Ensure that the entire machine/system is disconnected during the electrical installation.
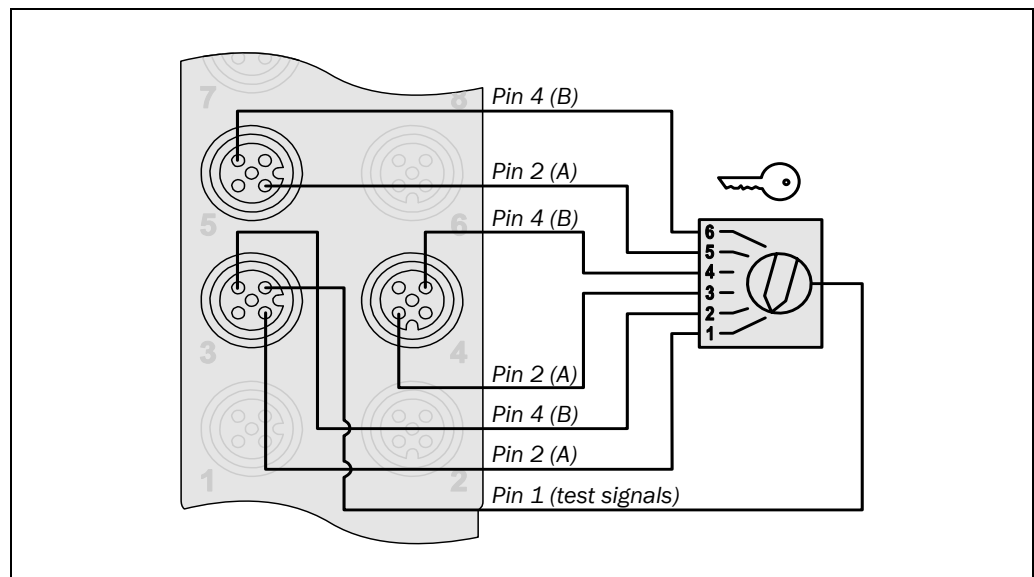
Notes

• The Bus Node UE 4100 with Function Package UE 4100 for C 4000 Standard/Advanced meets the interference suppression requirements (EMC) for industrial use (interference suppression class A). When used in residential areas it can cause interference.

• Since the signal transmitters (e.g. operating mode selector switch, teach-in key-operated switch, etc.) are mounted in control panels outside the installation, you must protect the corresponding connecting cables from short and cross-circuiting, e.g. by installing them in suitable cable conduits.

4.1   Operating mode selector switch

You can connect an operating mode selector switch with up to six switch positions to the field signal connections.

Fig. 6: Connection of the operating mode selector switch on the bus node (Example. The first field signal connection can be chosen as required.)

Notes

• If the safety light curtain can be selected on the machine side, this must also be selected via the operating mode selector switch.

• The operating mode selector switch *must* be a key-operated switch.

• You must always connect the outputs on the operating mode selector switch to field signal connections in order, starting with channel A for the first field signal connection used. Example: Operating mode selector switch 1 of 3 on field signal connection 5, channel A and B and on field signal connection 6, channel A.

Recommendation

Use an operating mode selector switch that has only the same number of switch settings that you actually need. This will help you to reduce the likelihood of operating errors.

💻

If you want to use cross-routing of the field signal connections directly to the C 4000, then in the CDS you must choose the appropriate application from the function package for the first field signal input on which you want to operate the operating mode selector switch: Device symbol **UE 4100 PROFIsafe**, context menu **Configuration draft**, **Edit**, file card **I/O #** option **Application** = "Operating mode selector switch 1 of # (C 4000)". Choose the oper-

ating mode selector switch to suit the number of operating modes actually configured in the C 4000, e.g. "1 of 4", if you have configured four operating modes. The CDS then automatically assigns the other field signal connections that follow to suit the number of operating modes.

4.2 Key-operated pushbutton for bypass

The bypass function may only be activated by a key-operated switch with an automatic reset and two levels or by two input signals that are independent of each other, e.g. two positioning switches.

Fig. 7: Alternative connections for the key-operated pushbutton for bypass on the bus node
*(Example. The field signal connection can be chosen as required.)*
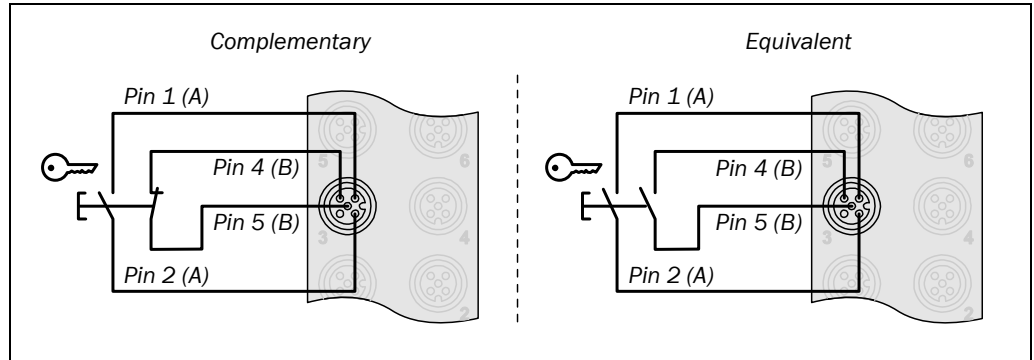
Notes

➢ Mount the key-operated pushbutton for bypass in such a way that the hazardous point is completely visible when the key-operated switch is used.

• The key-operated pushbutton for bypass must have volt-free contacts.

• If you connect the key-operated pushbutton for bypass to the bus node, to the FPLC or to a decentral F peripheral, then you can only connect a teach-in key-operated switch directly to the C 4000.

• On the definition of the two-channel layout (complementary/equivalent) see also the operating instructions "UE 4100 PROFIsafe Bus Node", chapter 3.

• You must configure the switching mode of the key-operated pushbutton for bypass to comply with the selected switch type (N/C, N/O or N/O, N/O) with the aid of the CDS: Device symbol **C 4000 Host (receiver)**, context menu **Configuration draft**, **Edit**, selection **System**, file card **General**, option **Key-operated pushbutton for bypass**.

• If you want to use cross-routing of the field signal connection directly to the C 4000, then in the CDS you must choose the appropriate application from the function package for the field signal input affected: Device symbol **UE 4100 PROFIsafe**, context menu **Configuration draft**, **Edit**, file card **I/O #** option **Application** = "Key-operated pushbutton for bypass (C 4000)".

4.3   Teach-in key-operated switch

Fig. 8: Connecting the teach-in key-operated switch to the bus node (Example. Field signal connection and channel can be chosen as required. Connection of a reset button to the C 4000 mandatory.)
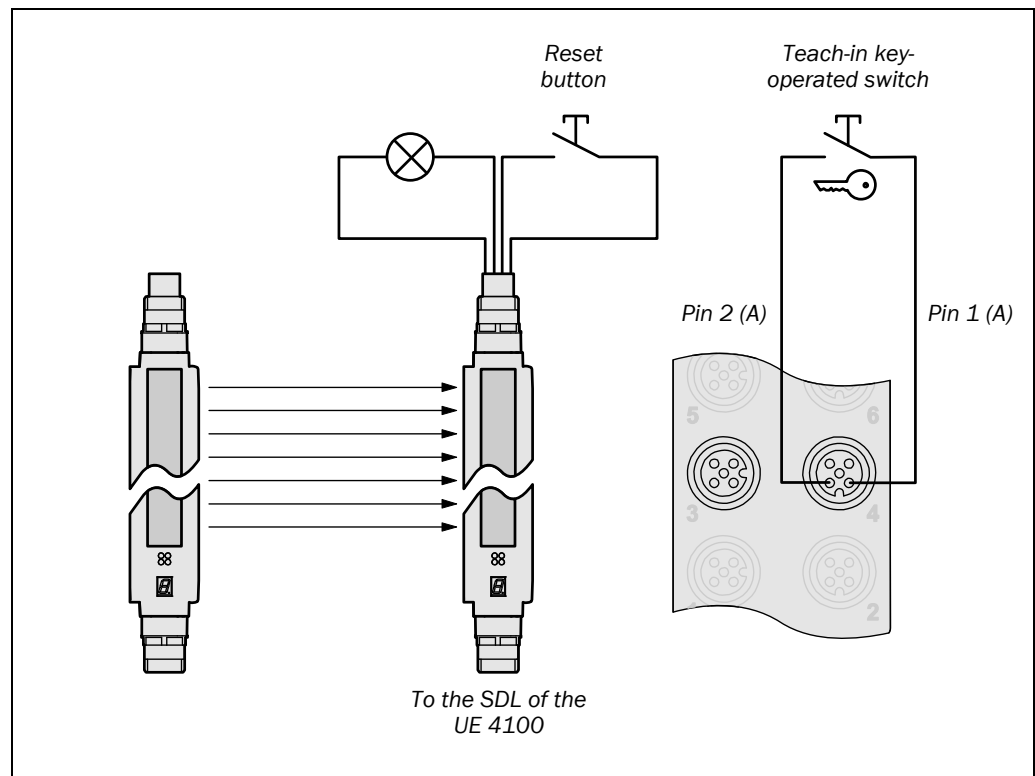
Note   You can connect the teach-in key-operated switch either to the C 4000, to a field signal connection on the bus node, to the FPLC or to another decentral F peripheral. If you do not connect the teach-in key-operated switch to the C 4000, but to a different point, then you can no longer use the bypass function of the C 4000 for technical reasons.

If you want to use cross-routing of the field signal connection directly to the C 4000, then in the CDS you must choose the appropriate application from the function package for the field signal input affected: Device symbol **UE 4100 PROFIsafe**, context menu **Configuration draft**, **Edit**, file card **I/O #** option **Application** = "Teach-in key-operated switch (C 4000)".
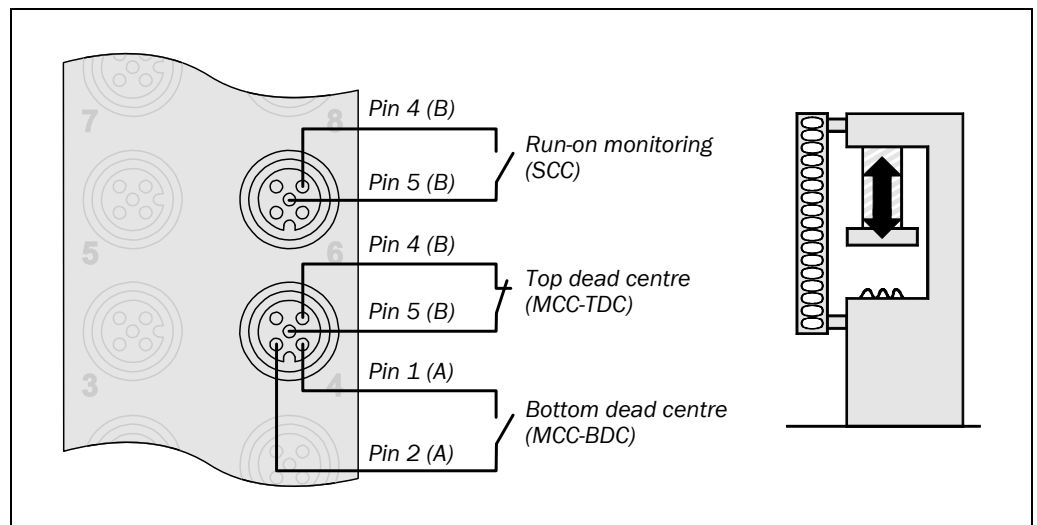
4.4   Machine cycle contacts

For the PSDI mode, the machine cycle contacts for the machine must be connected to the C 4000 through the bus node or the FPLC. Depending on the PSDI mode, the C 4000 can evaluate various contacts, some are mandatory (Tab. 4).

The signals of the machine cycle contact MCC-BDC and MCC-TDC are allowed to briefly overlap each other. MCC-BDC must always fall away before MCC-TDC.

Tab. 4: Necessary machine cycle contacts

Configured function	Top dead centre contact (MCC-TDC)	Bottom dead centre contact (MCC-BDC)	Run-on monitoring (SCC) contact
PSDI mode with restart interlock	■	■ (optional)	■ (optional)
PSDI mode without restart interlock	■	■ (optional)	■ (optional)
PSDI mode Alternative ("Sweden Mode")	■	■ (optional)	■ (optional)
Eccentric press mode	■	■	■ (optional)
Run-on monitoring	■	■ (optional)	■

Fig. 9: Connecting the machine cycle contact to the bus node (Example. Field signal connections and channels can be chosen as required.)

Note   The connections diagram shows one possible method of connection. You can connect the machine cycle contacts to any field signal connection.

You must ensure that the machine cycle contacts meet the following criteria:

Tab. 5: Criteria for connecting the machine cycle contacts

| Machine cycle contact	Criteria
MCC-TDC	• The contact is normally closed. • Before reaching the top dead centre, the contact must have been open for at least 100 ms. • The contact must be closed again at the top dead centre.
MCC-BDC	• The contact is normally open. • At the end of the dangerous movement, the contact must be closed. • After the MCC-TDC has opened, the contact can be opened again. • The contact must be opened again before the MCC-TDC is closed.
SCC	• The contact is normally open. • The contact must be closed when the machine is restarted. • The contact must already be closed when the MCC-TDC closes. • The contact may be opened shortly after the machine is restarted.

If you want to use cross-routing of the field signal connection directly to the C 4000, then in the CDS you must choose the appropriate application from the function package for the field signal connections affected: Device symbol **UE 4100 PROFIsafe**, context menu **Configuration draft**, **Edit**, file card **I/O #**, option **Application** =

• "MCC-TDC for PSDI and sampling (C 4000)"

• "MCC-BDC for eccentric press mode (C 4000)"

• "SCC for run-on monitoring (C 4000)"

4.5 Display *Reset required* of the C 4000

The C 4000 can signal the operational status *Reset required*. You can make this signal available at the bus node.

Fig. 10: Connection of a display for the "Reset required" output on the C 4000 (Example. Field signal connection and channels can be chosen as required.)
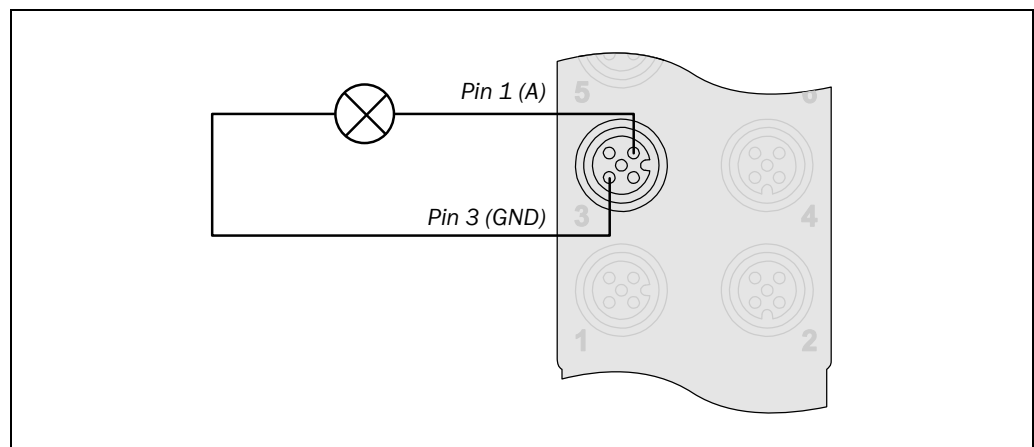
The representation of the *Reset required* display in the process image is described in section 9.1.1 "Input signals from the SDL connection to the FPLC" on page 34.

If you want to use cross-routing of the field signal connections directly to the C 4000, then in the CDS you must choose the appropriate application from the function package for the field signal input affected: Device symbol **UE 4100 PROFIsafe**, context menu **Configuration draft**, **Edit**, file card **I/O #**, option **Application** = "Display Reset required (C 4000)". In this case the FPLC no longer has write access to the field signal output.

4.6   Application diagnostic output (ADO) of the C 4000

The C 4000 has a signal output (ADO) that can be configured. You can make this signal available at the bus node, e.g. for an indicator.

The representation of the application diagnostic output in the process image is described in section 9.1.1 "Input signals from the SDL connection to the FPLC" on page 34.

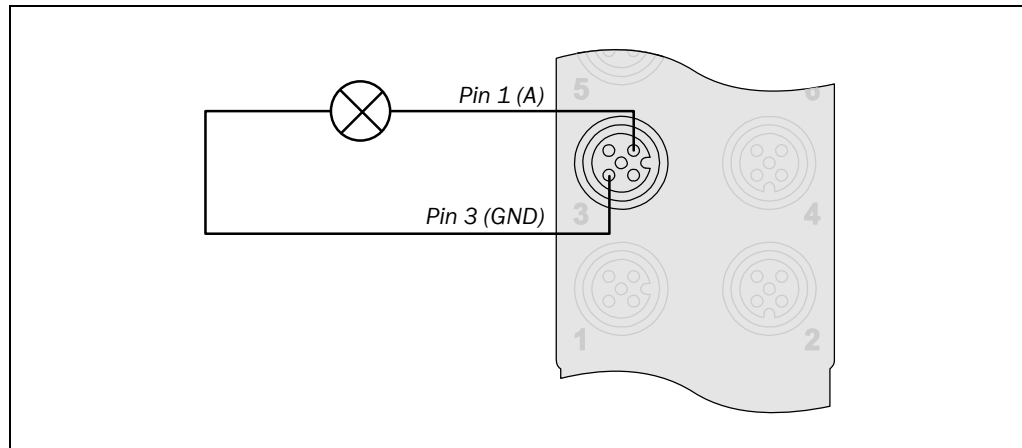*Fig. 11: Connection of the C 4000 application diagnostic output (Example. Field signal connection and channel can be chosen as required.)*

Pin 1 (A)

Pin 3 (GND)

- If you wish to use the signal output, then you must configure it with the aid of the CDS prior to commissioning. Device symbol **C 4000 Host** (**receiver**), context menu **Configuration draft**, **Edit**, file card **General**, option **Assignment of the signal output**.

- If you want to use cross-routing from the C 4000 directly to the field signal connections, then in the CDS you must choose the appropriate application from the function package for the field signal input affected: Device symbol **UE 4100 PROFIsafe**, context menu **Configuration draft**, **Edit**, file card **I/O #** option **Application** = "Application diagnostic output ADO (C 4000)". In this case the FPLC no longer has write access to the field signal output.

Device configuration after replacement!

If you replace a safety light curtain on which the signal output (ADO) is connected, then you must transfer the configuration to the device again. It is not sufficient to make the electrical connections, because new devices are supplied ex factory with the signal output deactivated.

WARNING

5   Commissioning

You will find information on commissioning in the operating instructions "UE 4100 PROFIsafe Bus Node" and in the operating instructions "C 4000 Safety Light Curtain Standard/Advanced".

⚠️
WARNING

Commissioning requires a thorough check by qualified personnel!

Before you operate a system protected by the Safety Light Curtain C 4000 in connection with the Bus Node UE 4100 for the first time, make sure that the system is first checked and approved by qualified personnel. Please read the notes in chapter "On safety" on page 8.

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6 Configuration

You will find information on configuration in the operating instructions "UE 4100 PROFIsafe Bus Node" and in the operating instructions "C 4000 Safety Light Curtain Standard/Advanced".

7 Fault diagnosis

This chapter describes how to identify and remedy errors and malfunctions during the operation of the bus node and related errors and malfunctions on the C 4000 connected.

7.1 What to do in case of faults

⚠
WARNING

Cease operation if the cause of the malfunction has not been clearly identified!

Stop the machine if you cannot clearly identify or allocate the error and if you cannot safely remedy the malfunction.

The system state lock-out

In case of certain faults or an erroneous configuration, the system can go into lock-out status. The 7-segment display of the connected C 4000 receiver then indicates R, c, E, F or L. To place the device back in operation, proceed as follows:

➤ Rectify the cause of the fault as per Tab. 6 on page 31.

➤ Switch off and on again the power supply for the entire system, i.e. the bus node including all devices on the SDL connection.

7.2 SICK support

If you cannot remedy an error with the help of the information provided in this chapter, please contact your local SICK representative.

7.3 Error displays of the diagnostics LEDs

You will find information on the error messages for the bus node in the operating instructions "UE 4100 PROFIsafe Bus Node".

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7.4 Additional error messages of the C 4000

The Safety Light Curtain C 4000 has new functions in connection with the Bus Node UE 4100 with Function Package UE 4100 for C 4000 Standard/Advanced. This section explains the meaning of the additional error displays of the 7-segment display and how to respond to the messages. You can find a description of the 7-segment display in the chapter titled "Status indicators" of the "C 4000 Safety Light Curtain" operating instructions.

Tab. 6: Error displays of the 7-segment display

Display	Possible cause	Remedying the error
𝐴⟳𝟎	Bus node configuration is incorrect	➢ Configure the bus node with the aid of the CDS. ➢ Check the connections from the C 4000 to the bus node.
𝑐⟳𝟓	Several operating modes configured, but none selected	➢ Check the connection and the function of the operating mode selector switch. ➢ Check the connection for the operating mode selector switch on the bus node or on the FPLC. ➢ Check the configuration of the operating mode selector switch in the bus node or in the FPLC.
𝑐⟳𝟔	Several operating modes selected simultaneously	➢ Check the connection and the function of the operating mode selector switch. ➢ Check the connection for the operating mode selector switch on the bus node or on the FPLC for short-circuiting.
𝑐⟳𝟕	Un-configured operating mode selected	➢ Configure the operating mode set on the operating mode selector switch, or ensure that this operating mode cannot be selected.
𝑐⟳𝟖	Key-operated push-button for bypass malfunctioning or invalid configuration	➢ Check whether the configuration of the key-operated pushbutton for bypass in the CDS matches the electrical connection. ➢ Check the function of the key-operated pushbutton for bypass and replace it if necessary. ➢ Ensure that both contacts of the key-operated pushbutton for bypass are operated within 2 seconds.
𝑐⟳𝟗	Short-circuit at the operating mode selector switch	➢ Check the operating mode inputs on the bus node for short-circuit to 24 V.

Display	Possible cause	Remedying the error
● Red	The C 4000 expects data from the bus node or from the FPLC	First check whether the light path on the C 4000 is clear and its configuration is correct. If this is the case, then the safety light curtain is waiting for data from the bus node or the FPLC.
		➢ Check whether there is an error in the bus node or the FPLC, or whether the bus node is in lock-out. (You can recognise an error or lock-out on the bus node by the ☀● **Red** DIA display on the bus node.)
		➢ Check whether the PROFIsafe communication between bus node and FPLC is established (see also error messages in the operating instructions for the bus node).
		➢ Check the information status of the C 4000 with the aid of the CDS (**Diagnostics**, **I/O monitor**).

7.5   Extended diagnostics

The CDS (Configuration & Diagnostic Software) includes extended diagnostic options. It allows you to narrow down the problem if the error is non-specific or if you experience usage downtime problems. Detailed information to be found

- in the online help function of the CDS (Configuration & Diagnostic Software)

- in the user manual for the CDS

How to conduct an extended diagnostics of the bus node:

➢ Connect the PC/Notebook in which the CDS has been installed to the configuration connection of the bus node or via PROFIBUS.

➢ Carry out a diagnostics on the desired device:

    – UE 4100: Device symbol **UE 4100 PROFIsafe**, context menu **Diagnostics**, **I/O monitor**

    – C 4000: Device symbol **UE 4100 PROFIsafe**, **SDL**, **C 4000 Host (receiver)**, context menu **Diagnostics**, **I/O monitor**

8 Ordering information

8.1 Delivery

The Function Package UE 4100 for C 4000 Standard/Advanced is available from SICK as part number 2 026 871. It includes the enable code using which you can activate the function package in the CDS. You will find the related operating instructions "UE 4100 PROFIsafe Bus Node" and "UE 4100 Function Package for C 4000 Standard/Advanced" on the CD-ROM "CDS — Configuration and Diagnostic Software".

8.2 Accessories

Tab. 7: Part numbers, accessories

Part	Part number
CDS (Configuration & Diagnostic Software) on CD-ROM including online documentation and operating instructions in all available languages	2 026 875

9 Annex

9.1 Process images

This section only contains the process images for the Safety Light Curtain C 4000 that become available after the Function Package UE 4100 for C 4000 Standard/Advanced is enabled.

Note The information in this chapter applies only to the Bus Node UE 4155.

9.1.1 Input signals from the SDL connection to the FPLC

Address SDL1	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0
Address SDL2	4.7	4.6	4.5	4.4	4.3	4.2	4.1	4.0
C 4000 Standard/Advanced	Reset required	Reset	Status signal output (ADO)	Reserved	OSSD Guest 2 green	OSSD Guest 1 green	Host OSSD green	OSSD green[1]

Address SDL1	3.7	3.6	3.5	3.4	3.3	3.2	3.1	3.0
Address SDL2	5.7	5.6	5.5	5.4	5.3	5.2	5.1	5.0
C 4000 Standard/Advanced	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Tab. 8: Process image of the input signals from the SDL connection to the FPLC

9.1.2 Output signal from the FPLC to the SDL connection

Note The following applies to the output signal in Tab. 9: When, in the bus node, a cross-routing has been configured from a field-signal input directly to the corresponding input signal of the C 4000, then the cross-routing takes priority over the FPLC output signal. I.e. the bus node does not route the corresponding output signal from the FPLC on to the SDL connection.

Address SDL1	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0
Address SDL2	4.7	4.6	4.5	4.4	4.3	4.2	4.1	4.0
C 4000 Standard/Advanced	Reserved	Activate teach-in	Operating mode switching					
			6	5	4	3	2	1

Address SDL1	3.7	3.6	3.5	3.4	3.3	3.2	3.1	3.0
Address SDL2	5.7	5.6	5.5	5.4	5.3	5.2	5.1	5.0
C 4000 Standard/Advanced	Bypass channel 2	Bypass channel 1	Reserved	Reserved	Reserved	Top dead centre (MCC-TDC)	Bottom dead centre (MCC-BDC)	Run-on monitoring (SCC)

Tab. 9: Process image of the output signals from the FPLC to the SDL connection

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[1] Depending on the bus node configuration either the OSSD status, which was read in via the hardware OSSD inputs, is entered here, or the one received via the safe SICK-device communication.

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9.2 Diagnostics data

Note The information in this chapter applies only to the Bus Node UE 4155. Information on the structure of the diagnostics message is contained in the operating instructions "UE 4100 PROFIsafe Bus Node".

9.2.1 Diagnostics data of the 1st device on SDL connection 1 (Host)

Address	26.7	26.6	26.5	26.4	26.3	26.2	26.1	26.0
C 4000 Standard/Advanced	Reserved	Contamination	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Address	27.7	27.6	27.5	27.4	27.3	27.2	27.1	27.0
C 4000 Standard/Advanced	Emergency Stop status	Selected operating mode of the C 4000 (000 = none, 001–110 = 1-6)			Operational status of the device 00: Operation 01: Initialisation 10: Configuration mode 11: Lock-out		Device error	Reserved

Address	28.7	28.6	28.5	28.4	28.3	28.2	28.1	28.0
C 4000 Standard/Advanced	Reserved	Reserved	Diagnostics protective field 00: Error 01: Invalid PSDI interruption 10: Valid PSDI interruption 11: No object/no PSDI interruption		Reserved	Teach-in active	Reserved	Teach-in key-operated switch operated

Address	29.7	29.6	29.5	29.4	29.3	29.2	29.1	29.0
C 4000 Standard/Advanced	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Status bypass	Reserved

Tab. 10: Diagnostics data of the 1st device on SDL connection 1 (Host)

9.2.2 Diagnostics data of the 2nd device on SDL connection 1 (Guest 1)

Address	30.7	30.6	30.5	30.4	30.3	30.2	30.1	30.0
C 4000 Standard/Advanced	Reserved	Contamination	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Address	31.7	31.6	31.5	31.4	31.3	31.2	31.1	31.0
C 4000 Standard/Advanced	Reserved	Selected operating mode of the C 4000 (000 = none, 001–110 = 1-6)			Operational status of the device 00: Operation 01: Initialisation 10: Configuration mode 11: Lock-out		Device error	Reserved

Address	32.7	32.6	32.5	32.4	32.3	32.2	32.1	32.0
C 4000 Standard/Advanced	Reserved	Reserved	Diagnostics protective field 00: Error 01: Invalid PSDI interruption 10: Valid PSDI interruption 11: No object/no PSDI interruption		Reserved	Teach-in active	Reserved	Teach-in key-operated switch operated

Address	33.7	33.6	33.5	33.4	33.3	33.2	33.1	33.0
C 4000 Standard/Advanced	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Tab. 11: Diagnostics data of the 2nd device on SDL connection 1 (Guest 1)

9.2.3 Diagnostics data of the 3rd device on SDL connection 1 (Guest 2)

Address	34.7	34.6	34.5	34.4	34.3	34.2	34.1	34.0
C 4000 Standard/Advanced	Reserved	Contamination	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Address	35.7	35.6	35.5	35.4	35.3	35.2	35.1	35.0
C 4000 Standard/Advanced	Reserved	Selected operating mode of the C 4000 (000 = none, 001–110 = 1-6)			Operational status of the device 00: Operation 01: Initialisation 10: Configuration mode 11: Lock-out		Device error	Reserved

Address	36.7	36.6	36.5	36.4	36.3	36.2	36.1	36.0
C 4000 Standard/Advanced	Reserved	Reserved	Diagnostics protective field 00: Error 01: Invalid PSDI interruption 10: Valid PSDI interruption 11: No object/no PSDI interruption		Reserved	Teach-in active	Reserved	Teach-in key-operated switch operated

Address	37.7	37.6	37.5	37.4	37.3	37.2	37.1	37.0
C 4000 Standard/Advanced	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Tab. 12: Diagnostics data of the 3rd device on SDL connection 1 (Guest 2)

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9.2.4 Diagnostics data of the 1st device on SDL connection 2 (Host)

Address	38.7	38.6	38.5	38.4	38.3	38.2	38.1	38.0
C 4000 Standard/Advanced	Reserved	Contami-nation	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Address	39.7	39.6	39.5	39.4	39.3	39.2	39.1	39.0
C 4000 Standard/Advanced	Emergency Stop status	Selected operating mode of the C 4000 (000 = none, 001–110 = 1-6)			Operational status of the device 00: Operation 01: Initialisation 10: Configuration mode 11: Lock-out		Device error	Reserved

Address	40.7	40.6	40.5	40.4	40.3	40.2	40.1	40.0
C 4000 Standard/Advanced	Reserved	Reserved	Diagnostics protective field 00: Error 01: Invalid PSDI interruption 10: Valid PSDI interruption 11: No object/no PSDI interruption		Reserved	Teach-in active	Reserved	Teach-in key-operated switch operated

Address	41.7	41.6	41.5	41.4	41.3	41.2	41.1	41.0
C 4000 Standard/Advanced	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Status bypass	Reserved

Tab. 13: Diagnostics data of the 1st device on SDL connection 2 (Host)

9.2.5 Diagnostics data of the 2nd device on SDL connection 2 (Guest 1)

Address	42.7	42.6	42.5	42.4	42.3	42.2	42.1	42.0
C 4000 Standard/Advanced	Reserved	Contami-nation	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Address	43.7	43.6	43.5	43.4	43.3	43.2	43.1	43.0
C 4000 Standard/Advanced	Reserved	Selected operating mode of the C 4000 (000 = none, 001–110 = 1-6)			Operational status of the device 00: Operation 01: Initialisation 10: Configuration mode 11: Lock-out		Device error	Reserved

Address	44.7	44.6	44.5	44.4	44.3	44.2	44.1	44.0
C 4000 Standard/Advanced	Reserved	Reserved	Diagnostics protective field 00: Error 01: Invalid PSDI interruption 10: Valid PSDI interruption 11: No object/no PSDI interruption		Reserved	Teach-in active	Reserved	Teach-in key-operated switch operated

Address	45.7	45.6	45.5	45.4	45.3	45.2	45.1	45.0
C 4000 Standard/Advanced	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Tab. 14: Diagnostics data of the 2nd device on SDL connection 2 (Guest 1)

9.2.6 Diagnostics data of the 3rd device on SDL connection 2 (Guest 2)

Address	46.7	46.6	46.5	46.4	46.3	46.2	46.1	46.0
C 4000 Standard/Advanced	Reserved	Contami-nation	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Address	47.7	47.6	47.5	47.4	47.3	47.2	47.1	47.0
C 4000 Standard/Advanced	Reserved	Selected operating mode of the C 4000 (000 = none, 001–110 = 1-6)			Operational status of the device 00: Operation 01: Initialisation 10: Configuration mode 11: Lock-out		Device error	Reserved

Address	48.7	48.6	48.5	48.4	48.3	48.2	48.1	48.0
C 4000 Standard/Advanced	Reserved	Reserved	Diagnostics protective field 00: Error 01: Invalid PSDI interruption 10: Valid PSDI interruption 11: No object/no PSDI interruption		Reserved	Teach-in active	Reserved	Teach-in key-operated switch operated

Address	49.7	49.6	49.5	49.4	49.3	49.2	49.1	49.0
C 4000 Standard/Advanced	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Tab. 15: Diagnostics data of the 3rd device on SDL connection 2 (Guest 2)

9.3 Declaration of conformity

SICK

EC Declaration of Conformity

**Under the terms of EC Machine Directive 98/37/EC, Appendix VI,
and EMC 89/336/EEC**

We hereby declare that the devices

of the product family UE4100

are safety components for a machine constructed as per the EC directive 98/37/EC art. 1 para. 2. This declaration will lose its validity if any modification to a device used in the plant is made without prior consultation.

We employ a quality system certified by the DQS (German Quality Assurance Society), No. 462, as per ISO 9001 and have therefore observed the regulations in accordance with module H as well as the following EC directives and EN standards during development and production:

1. **EC directives**   EC machine directive 98/37/EC,
   EC EMC directive 89/336/EEC as per 92/31/EEC, 93/68/EEC, 93/465/EEC

2. **Harmonized**   EN 954-1   Safety-related components of controllers   Ed. 96-12
   standards and   EN 61000-6-4   Electromagnetic compatibility   Ed. 2001
   preliminary   EN 61496-1   Safety of mach., active opto-electronic
   standards   protective devices (AOPD)   Ed. 97-12
   used   EN 61508   Functional safety of electrical/electronic/
   Part 2,6,7   programmable electronic safety-related   Ed. 2000
   Part 1,3,4,5   systems   Ed. 1998

3. **Test result**   IEC 61508   SIL 3 / EN 954-1 Safety category 4
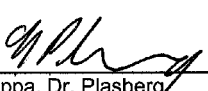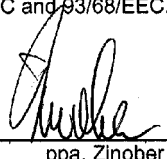
Conformance of a type sample belonging to the above-mentioned product family with the regulations from the
EC machine directive has been certified by:

Address of   TÜV Rheinland Anlagentechnik GmbH
notified   Am Grauen Stein
authority   D-51105 Köln
(Germany)

Certificate number   968/EL 199.00/03 dated 2003-02-20

The CE mark was affixed to the appliance in conformance with directive 89/336/EEC and 93/68/EEC.

Waldkirch/Br.,   2003-02-20

ppa. Dr. Plasberg
(Head of Research & Development
Division Industrial Safety Systems)

ppa. Zinober
(Head of Production
Division Industrial Safety Systems)

The declaration certifies conformance with the listed directives, but does not guarantee product characteristics. The safety instructions contained in the product documentation must be observed.

Mat.-Nr.: 9 067 124

II - 16666

8 006 440.0499 BK· BK

8 010 211/20-02-03 **39**

9.4   List of tables

9.5   List of illustrations

Contact:

A u s t r a l i a
Phone +61 3 9497 4100
1 800 33 48 02 – tollfree
Fax   +61 3 9497 1187

A u s t r i a
Phone +43 (0)22 36 62 28 8-0
Fax   +43 (0)22 36 62 28 85

B e l g i u m / L u x e m b o u r g
Phone +32 (0)2 466 55 66
Fax   +32 (0)2 463 31 04

B r a z i l
Phone +55 11 5561 2683
Fax   +55 11 5535 4153

C h i n a
Phone +85 2-2763 6966
Fax   +85 2-2763 6311

C z e c h   R e p u b l i c
Phone +420 2 57 91 18 50
Fax   +420 2 57 81 0559

D e n m a r k
Phone +45 45 82 64 00
Fax   +45 45 82 64 01

F i n l a n d
Phone +358 (0)9 25 15 800
Fax   +358 (0)9 25 15 8055

F r a n c e
Phone +33 1 64 62 35 00
Fax   +33 1 64 62 35 77

G e r m a n y
Phone +49 (0)2 11 53 01-0
Fax   +49 (0)2 11 53 01-100

G r e a t   B r i t a i n
Phone +44 (0)1727 831121
Fax   +44 (0)1727 856767

I t a l y
Phone +39 02 92 14 20 62
Fax   +39 02 92 14 20 67

J a p a n
Phone +81 (0)3 3358 1341
Fax   +81 (0)3 3358 9048

K o r e a
Phone +82-2-786 6321/4
Fax   +82-2-786 6325

N e t h e r l a n d s
Phone +31 (0)30 229 25 44
Fax   +31 (0)30 229 39 94

N o r w a y
Phone +47 67 81 50 00
Fax   +47 67 81 50 01

P o l a n d
Phone +48 22 837 40 50
Fax   +48 22 837 43 88

S i n g a p o r e
Phone +65 6744 3732
Fax   +65 6841 7747

S p a i n
Phone +34 93 480 31 00
Fax   +34 93 473 44 69

S w e d e n
Phone +46 8 680 64 50
Fax   +46-8 710 18 75

S w i t z e r l a n d
Phone +41 41 619 29 39
Fax   +41 41 619 29 21

T a i w a n
Phone +886 2 2365-6292
Fax   +886 2 2368-7397

U S A / C a n a d a / M e x i c o
Phone +1(952) 941-6780
1-800-325-7425 – tollfree
Fax   +1(952) 941-9287

Representatives and agencies
in all major industrial nations.

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